NAME: ______________________ NETID: ____________

UNIVERSITY OF NOTRE DAME

Exam 1.p.fa.2024

Principles of Computing

30th of October, 2024

1 *Answer the following questions either True or False.*

The first five questions on this page are about the ***shell***; the rest are about ***Python***.

I. The *root* of a UNIX-based file system is a directory named `/root`.

◯ *True*
◯ *False*

II. The `cd` command can be used to change a directory's name.

◯ *True*
◯ *False*

III. The name `~` is an alias for the current user's *"home"* directory.

◯ *True*
◯ *False*

IV. `mv(pumpkins.py, ~/patch)` will move `pumpkins.py` to the `patch` directory in the user's home folder.

◯ *True*
◯ *False*

V. `touch closet/skeletons.csv` will create a new file named `skeletons.csv` within `closet` in the home folder.

◯ *True*
◯ *False*

VI. `", ".join(["this is Halloween", "this is Halloween"])[19::1]` is valid syntax.

◯ *True*
◯ *False*

VII. Every value in *Python* is an object, and every object has a type.

◯ *True*
◯ *False*

VIII. Every method is a function in *Python*.

◯ *True*
◯ *False*

IX. Every function returns a value.

◯ *True*
◯ *False*

X. `print("Hello, world!")` returns an object of type `str`.

◯ *True*
◯ *False*

NAME: ______________________ NETID: ______________

2 *Answer the following questions without justification.*

i. What is the value of `scary_string` at the end of the following block?

```
scary_string = "i am the one hiding under your bed".split(" ")
scary_string[0:2] += ["not"]
scary_string = " ".join(scary_string)
```

ii. What is the result of the following expression?

```
len("".join("everyone hail to the pumpkin song\n".split(" ")))
```

iii. What is the value of `spooky_func(" ")` with the definition below?

```
def spooky_func(ghost):
  x  = "i am the shadow on the moon at night".split(ghost)
  return x.insert(2, "not")
```

iv. How many times will line 4 be evaluated in the block of code below?

```
1 def rattle(something):
2   return len(something) % 2 == 0
3 bones = list(range(101))
4 while rattle(bones):
5   bones = bones[:bones[-1]/2]
```

v. What value is returned as a result of calling the function below?

```
def trick_or_treat():
  ll = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
  fear = 0
  for x in ll:
    for y, z in enumerate(x):
      if z % (y + 1) == 0:
        fear += z
    if fear == 13:
      return "trick"
  return "treat"
```

NAME: ______________________ NETID: ______________

3 *Answer the following questions without justification.*

i. What *type of error* will be thrown when this code is run?[1]

```python
1  def jump_scare(days_left):
2    return days_left == 7
3  upper_bound = input("Enter your maximum tolerance for terror: ")
4  for i in range(upper_bound):
5    print(jump_scare(days_left))
```

[1] You may assume the user provides valid, sensible input (*e.g.*, 10) when prompted.

ii. Indicate *all lines* in the following code block that would *throw an error.*

```python
1  dungeon = []
2  for i in range(5):
3    room = []
4    for j in range(5):
5      room += [i*j]
6    dungeon.append(room)
7  if sum(dungeon) % 13 == 0:
8    return "creepy"
9  return "wet"
```

iii. The block of code below throws an error; on *what line* does it occur?

```python
1  from random import randint
2  weight = "0"
3  giles_corey = "185"
4  while plea not in ["guilty", "not guilty"]:
5    weight += int(f"{randint(1, 10)}")
6    giles_corey -= int(weight)
7    plea = "more weight"
```

iv. What is `monster_sort([3, 1, -1, 0, 5, 3])` based on the code below?

```python
1   def monster_sort(ll):
2     rr = []
3     for l in ll:
4       scared = False
5       for i, r in enumerate(rr):
6         if (l < r) and (not scared):
7           rr.insert(i, l)
8           scared = True
9       if not scared:
10        rr.append(l)
11    return rr
```

NAME: ______________________ NETID: ______________

4 *Answer the following questions without justification.*

Given two vectors $x = [x_0, x_1, \ldots, x_{n-1}]$ and $y = [y_0, y_1, \ldots, y_{n-1}]$ of the same positive integer length n, we compute the *inner product* of x with y, which we denote $\langle x, y \rangle$, as follows.

$$\langle x, y \rangle = x_0 y_0 + x_1 y_1 + \cdots + x_{n-1} y_{n-1}$$

For example, the inner product of $[1,2,3]$ and $[2,4,8]$ is below.

$$\begin{aligned} \langle [1,2,3], [2,4,8] \rangle &= 1 \cdot 2 + 2 \cdot 4 + 3 \cdot 8 \\ &= 2 + 8 + 24 \\ &= 34 \end{aligned}$$

Write a function in *Python* that takes two lists of floating point numbers representing *vectors* as inputs and returns their *inner product* as output *if they are the same length*, but returns the string `"ERROR"` otherwise.

RESTRICTIONS:

- No use of `import` statements.
- No use of methods for any type.
- No use of the built-in functions:
  - `sum()`
  - `max()`
  - `min()`
- No use of functions, methods, types, or control structures that we have not yet covered in class nor problem sets.

NOTE: you may name your function and your variables whatever you'd like.